

## ABSTRACT OF THE DISCLOSURE

A charge detection system used in an image sensor consists of the vertical punch through transistor with the gate surrounding its source and connected to it. The charge detector has a large conversion gain, high dynamic range, low reset feed through, and low noise. It senses charge nondestructively, which avoids generation of kTC noise. Additional embodiments of the invention include a standard reset gate option, a resistive reset gate option, and a lateral punch through transistor reset option to minimize the reset feed through. The charge detection system can be used in all know CCD image sensor architectures as well as in most CMOS image sensor architectures.